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Atmospheric Neutrino Flux Around Super-Kamiokande

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Abstract

The simulated atmospheric neutrino flux around Super-Kamiokande detector is tabulated in this report. The corresponding fitting is also given.

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This result has been published in Phys. Rev. **D 67**, 073022(2003). But to avoid the paper get too long, we deleted the long 3-D table of the flux as the function of energy, zenithal angle and azimuthal angle in the final submission.

For those analysis expert who are interested in our flux, the 2-D table of flux as the function of energy and zenithal angle is given here as well as the corresponding fitting to the spectra for each zenithal angle bin.

Due to the statistical problem, we would recommend to use the fitting as input in the data analysis.

The fitting function used is taken as

$$f(E_\nu) = c_1 \ (\ c_2 \ \exp(\ -c_3 \ E_\nu \ ) + \exp(\ - \ E_\nu^{c_4} \ ) \ ) \ E_\nu^{c_5} \tag{1}$$

where $f(E_\nu)$ is the flux, E_ν the neutrino energy, and c_1, c_2, c_3, c_4 and c_5 are fitting parameters.

The fitting range is from 0.1 to 20.0 GeV.

	ν_e FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-1.0 - -0.9	-0.9 - -0.8	-0.8 - -0.7	-0.7 - -0.6	-0.6 - -0.5
0.100-0.124	2291. ± 125.	2841. ± 147.	3202. ± 168.	3343. ± 186.	3200. ± 196.
0.124-0.153	1974. ± 105.	2155. ± 115.	2490. ± 134.	2173. ± 132.	2178. ± 145.
0.153-0.189	1491. ± 82.	1529. ± 88.	1575. ± 94.	1736. ± 107.	1750. ± 117.
0.189-0.233	1063. ± 62.	1136. ± 68.	1071. ± 70.	1317. ± 84.	1136. ± 85.
0.233-0.289	699. ± 45.	731. ± 48.	814. ± 55.	788. ± 58.	766. ± 61.
0.289-0.357	524. ± 35.	515. ± 36.	618. ± 43.	598. ± 45.	593. ± 49.
0.357-0.441	331. ± 25.	335. ± 26.	359. ± 29.	391. ± 33.	366. ± 34.
0.441-0.545	220. ± 18.	204. ± 18.	226. ± 21.	267. ± 24.	202. ± 22.
0.545-0.674	155. ± 14.	135. ± 13.	139. ± 14.	159. ± 16.	172. ± 18.
0.674-0.833	102. ± 10.	96. ± 10.	95. ± 11.	79. ± 10.	95. ± 12.
0.833-1.029	53. ± 6.	52. ± 7.	60. ± 7.	64. ± 8.	51. ± 8.
1.029-1.272	32. ± 4.	33. ± 5.	33. ± 5.	29. ± 5.	41. ± 6.
1.272-1.572	27. ± 4.	16. ± 3.	19. ± 3.	29. ± 4.	28. ± 5.
1.572-1.943	6. ± 1.	10. ± 2.	7. ± 1.	16. ± 3.	11. ± 2.
1.943-2.402	6. ± 1.	5. ± 1.	6. ± 1.	4. ± 1.	9. ± 2.
2.402-2.969	1.8 ± 0.5	2.9 ± 0.8	2.5 ± 0.6	6. ± 1.	6. ± 1.
2.969-3.670	1.4 ± 0.5	1.9 ± 0.6	1.7 ± 0.5	2.1 ± 0.7	2.4 ± 0.7
3.670-4.537	1.2 ± 0.4	0.7 ± 0.1	0.9 ± 0.3	0.8 ± 0.2	0.7 ± 0.2
4.537-5.608	0.4 ± 0.2	0.4 ± 0.2	0.6 ± 0.2	0.7 ± 0.3	0.7 ± 0.3
5.608-6.931	0.2 ± 0.1	0.17 ± 0.05	0.36 ± 0.08	0.24 ± 0.06	0.4 ± 0.1
6.931-8.568	0.07 ± 0.03	0.2 ± 0.1	0.16 ± 0.05	0.15 ± 0.04	0.10 ± 0.04
8.568-10.59	0.03 ± 0.01	0.04 ± 0.01	0.03 ± 0.01	0.05 ± 0.02	0.09 ± 0.03
10.59-13.09	0.02 ± 0.01	0.011 ± 0.0062	0.04 ± 0.02	0.04 ± 0.02	0.02 ± 0.01
13.09-16.18	0.011 ± 0.009	0.002 ± 0.0009	0.03 ± 0.02	0.022 ± 0.009	0.005 ± 0.003
16.18-20.00	0.010 ± 0.004	0.001 ± 0.0005	0.006 ± 0.004	0.002 ± 0.002	0.008 ± 0.004

Table 1: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_e FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-0.5 - -0.4	-0.4 - -0.3	-0.3 - -0.2	-0.2 - -0.1	-0.1 - 0.0
0.100-0.124	2880. ± 202.	3127. ± 241.	3151. ± 283.	4675. ± 471.	5984. ±1012.
0.124-0.153	2086. ± 156.	2650. ± 202.	2813. ± 245.	2371. ± 282.	2922. ± 484.
0.153-0.189	1831. ± 132.	1451. ± 129.	1562. ± 162.	2188. ± 252.	2875. ± 585.
0.189-0.233	1088. ± 91.	1159. ± 105.	1292. ± 133.	1063. ± 151.	1481. ± 330.
0.233-0.289	814. ± 70.	787. ± 79.	800. ± 94.	812. ± 122.	1407. ± 329.
0.289-0.357	558. ± 51.	515. ± 56.	583. ± 70.	776. ± 112.	366. ± 92.
0.357-0.441	349. ± 37.	325. ± 39.	313. ± 44.	374. ± 66.	254. ± 89.
0.441-0.545	260. ± 29.	192. ± 26.	211. ± 33.	349. ± 55.	249. ± 78.
0.545-0.674	165. ± 20.	177. ± 24.	179. ± 27.	112. ± 27.	136. ± 44.
0.674-0.833	91. ± 13.	92. ± 14.	141. ± 23.	60. ± 17.	147. ± 70.
0.833-1.029	49. ± 8.	73. ± 12.	73. ± 14.	46. ± 12.	23. ± 6.
1.029-1.272	42. ± 7.	33. ± 7.	45. ± 10.	25. ± 7.	18. ± 4.
1.272-1.572	30. ± 5.	29. ± 6.	30. ± 7.	39. ± 10.	53. ± 21.
1.572-1.943	13. ± 3.	23. ± 5.	16. ± 4.	17. ± 6.	22. ± 8.
1.943-2.402	6. ± 2.	6. ± 2.	17. ± 5.	11. ± 5.	7. ± 4.
2.402-2.969	3.4 ± 0.8	7. ± 2.	5. ± 1.	5. ± 2.	2. ± 1.
2.969-3.670	4. ± 1.	4. ± 1.	4. ± 1.	1.3 ± 0.3	1.8 ± 0.7
3.670-4.537	0.8 ± 0.2	1.2 ± 0.5	1.1 ± 0.3	3. ± 1.	2. ± 1.
4.537-5.608	0.5 ± 0.1	1.2 ± 0.5	0.6 ± 0.2	0.4 ± 0.3	1.3 ± 0.6
5.608-6.931	0.6 ± 0.3	0.5 ± 0.1	0.4 ± 0.1	0.8 ± 0.3	0.5 ± 0.4
6.931-8.568	0.4 ± 0.2	0.3 ± 0.1	0.19 ±0.08	0.3 ± 0.1	0.3 ± 0.2
8.568-10.59	0.09 ± 0.03	0.1 ± 0.05	0.07 ± 0.03	0.06 ± 0.05	0.4 ± 0.2
10.59-13.09	0.03 ± 0.01	0.06 ± 0.02	0.05 ± 0.04	0.07 ± 0.03	0.0 ± 0.0
13.09-16.18	0.04 ± 0.02	0.03 ± 0.01	0.06 ± 0.03	0.05 ± 0.02	0.09 ± 0.07
16.18-20.00	0.004 ± 0.003	0.007 ±0.004	0.013 ±0.008	0.03 ± 0.02	0.03 ± 0.02

Table 2: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_e FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.0 - 0.1	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4	0.4 - 0.5
0.100-0.124	5422. ± 952.	3402. ± 385.	2681. ± 261.	2107. ± 191.	2211. ± 175.
0.124-0.153	3790. ± 631.	2524. ± 302.	1648. ± 179.	1724. ± 160.	1489. ± 129.
0.153-0.189	2971. ± 596.	2075. ± 244.	1073. ± 132.	1481. ± 133.	1187. ± 103.
0.189-0.233	1301. ± 317.	1030. ± 154.	1016. ± 113.	830. ± 86.	768. ± 74.
0.233-0.289	1542. ± 340.	752. ± 118.	792. ± 90.	684. ± 71.	458. ± 50.
0.289-0.357	497. ± 164.	558. ± 89.	415. ± 57.	507. ± 55.	372. ± 41.
0.357-0.441	495. ± 158.	354. ± 58.	289. ± 43.	329. ± 39.	294. ± 33.
0.441-0.545	130. ± 55.	217. ± 42.	177. ± 31.	281. ± 33.	211. ± 25.
0.545-0.674	112. ± 43.	151. ± 35.	133. ± 23.	116. ± 17.	140. ± 18.
0.674-0.833	178. ± 78.	88. ± 21.	132. ± 22.	59. ± 11.	105. ± 14.
0.833-1.029	25. ± 7.	76. ± 18.	58. ± 12.	46. ± 9.	70. ± 10.
1.029-1.272	20. ± 5.	44. ± 12.	29. ± 7.	33. ± 7.	42. ± 7.
1.272-1.572	51. ± 21.	28. ± 7.	29. ± 7.	18. ± 4.	23. ± 4.
1.572-1.943	16. ± 5.	12. ± 4.	16. ± 4.	15. ± 3.	12. ± 3.
1.943-2.402	11. ± 5.	16. ± 5.	11. ± 3.	7. ± 2.	12. ± 3.
2.402-2.969	3. ± 1.	3.4 ± 0.9	8. ± 3.	4. ± 1.	6. ± 2.
2.969-3.670	1.3 ± 0.6	1.7 ± 0.5	2.0 ± 0.4	5. ± 2.	3. ± 1.
3.670-4.537	4. ± 2.	0.8 ± 0.3	2.0 ± 0.8	0.6 ± 0.2	1. ± 0.2
4.537-5.608	1.4 ± 0.6	1.6 ± 0.5	2.2 ± 0.9	0.9 ± 0.4	0.8 ± 0.4
5.608-6.931	0.3 ± 0.3	0.9 ± 0.3	0.4 ± 0.1	0.4 ± 0.1	0.14 ± 0.04
6.931-8.568	0.3 ± 0.2	0.3 ± 0.1	0.19 ± 0.09	0.16 ± 0.06	0.17 ± 0.05
8.568-10.59	0.3 ± 0.2	0.7 ± 0.4	0.13 ± 0.07	0.04 ± 0.02	0.12 ± 0.05
10.59-13.09	0.04 ± 0.05	0.04 ± 0.02	0.03 ± 0.02	0.01 ± 0.01	0.08 ± 0.03
13.09-16.18	0.09 ± 0.07	0.03 ± 0.02	0.07 ± 0.02	0.06 ± 0.04	0.03 ± 0.02
16.18-20.00	0.09 ± 0.05	0.02 ± 0.01	0.004 ± 0.003	0.007 ± 0.005	0.005 ± 0.003

Table 3: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_e FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.5 - 0.6	0.6 - 0.7	0.7 - 0.8	0.8 - 0.9	0.9 - 1.0
0.100-0.124	1642. ± 136.	1736. ± 129.	1836. ± 124.	1706. ± 113.	1528. ± 100.
0.124-0.153	1566. ± 120.	1196. ± 95.	1337. ± 94.	1295. ± 88.	1180. ± 78.
0.153-0.189	1048. ± 87.	1122. ± 84.	1126. ± 79.	946. ± 67.	888. ± 62.
0.189-0.233	771. ± 67.	742. ± 61.	685. ± 54.	810. ± 56.	709. ± 49.
0.233-0.289	596. ± 53.	612. ± 50.	540. ± 43.	565. ± 42.	531. ± 39.
0.289-0.357	448. ± 41.	400. ± 36.	491. ± 38.	368. ± 31.	360. ± 29.
0.357-0.441	267. ± 28.	274. ± 27.	264. ± 24.	285. ± 24.	249. ± 21.
0.441-0.545	223. ± 23.	218. ± 21.	186. ± 18.	174. ± 17.	172. ± 16.
0.545-0.674	120. ± 15.	150. ± 16.	138. ± 14.	126. ± 13.	82. ± 9.
0.674-0.833	138. ± 15.	76. ± 10.	82. ± 10.	71. ± 9.	61. ± 7.
0.833-1.029	54. ± 8.	67. ± 9.	44. ± 6.	42. ± 6.	46. ± 6.
1.029-1.272	42. ± 6.	39. ± 6.	28. ± 4.	36. ± 5.	24. ± 4.
1.272-1.572	16. ± 3.	22. ± 4.	15. ± 3.	21. ± 3.	16. ± 3.
1.572-1.943	12. ± 3.	11. ± 2.	8. ± 2.	13. ± 2.	8. ± 2.
1.943-2.402	11. ± 2.	7. ± 2.	10. ± 2.	11. ± 2.	4. ± 1.
2.402-2.969	4. ± 1.	4. ± 1.	3.6 ± 0.9	3.0 ± 0.8	2.9 ± 0.8
2.969-3.670	1.8 ± 0.7	1.9 ± 0.6	2.3 ± 0.7	2.2 ± 0.7	1.8 ± 0.6
3.670-4.537	0.9 ± 0.2	1.3 ± 0.5	0.9 ± 0.3	1.3 ± 0.4	0.37 ± 0.08
4.537-5.608	0.4 ± 0.1	0.6 ± 0.3	0.6 ± 0.2	0.4 ± 0.2	0.22 ± 0.06
5.608-6.931	0.20 ± 0.06	0.23 ± 0.06	0.15 ± 0.05	0.2 ± 0.2	0.08 ± 0.03
6.931-8.568	0.10 ± 0.03	0.08 ± 0.02	0.12 ± 0.03	0.06 ± 0.02	0.08 ± 0.03
8.568-10.59	0.07 ± 0.03	0.10 ± 0.03	0.03 ± 0.01	0.04 ± 0.02	0.005 ± 0.003
10.59-13.09	0.04 ± 0.02	0.017 ± 0.008	0.012 ± 0.005	0.020 ±0.007	0.03 ± 0.01
13.09-16.18	0.03 ± 0.02	0.014 ± 0.006	0.010 ± 0.005	0.02 ± 0.01	0.013 ± 0.006
16.18-20.00	0.003 ±0.003	0.002 ± 0.002	0.004 ± 0.003	0.003 ±0.001	0.006 ± 0.003

Table 4: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_μ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-1.0 - -0.9	-0.9 - -0.8	-0.8 - -0.7	-0.7 - -0.6	-0.6 - -0.5
0.100-0.124	5095. ± 187.	5282. ± 202.	5764. ± 224.	5269. ± 229.	6090. ± 270.
0.124-0.153	4227. ± 153.	3822. ± 153.	4470. ± 178.	4414. ± 188.	3889. ± 190.
0.153-0.189	2881. ± 112.	2913. ± 120.	3025. ± 131.	3357. ± 148.	3030. ± 152.
0.189-0.233	1931. ± 82.	2207. ± 94.	2298. ± 102.	2265. ± 108.	1878. ± 106.
0.233-0.289	1466. ± 64.	1435. ± 67.	1504. ± 74.	1499. ± 79.	1489. ± 85.
0.289-0.357	997. ± 47.	994. ± 50.	1071. ± 55.	1156. ± 62.	1094. ± 66.
0.357-0.441	715. ± 36.	608. ± 35.	749. ± 42.	800. ± 46.	797. ± 50.
0.441-0.545	440. ± 25.	476. ± 28.	465. ± 29.	479. ± 31.	436. ± 33.
0.545-0.674	339. ± 20.	326. ± 20.	318. ± 21.	303. ± 22.	317. ± 25.
0.674-0.833	212. ± 14.	202. ± 14.	221. ± 16.	198. ± 16.	191. ± 17.
0.833-1.029	137. ± 10.	121. ± 10.	126. ± 10.	119. ± 11.	128. ± 12.
1.029-1.272	80. ± 7.	75. ± 7.	78. ± 7.	84. ± 8.	65. ± 7.
1.272-1.572	48. ± 4.	60. ± 5.	49. ± 5.	40. ± 5.	45. ± 5.
1.572-1.943	26. ± 3.	31. ± 3.	41. ± 4.	30. ± 4.	34. ± 5.
1.943-2.402	19. ± 2.	16. ± 2.	17. ± 2.	20. ± 3.	16. ± 2.
2.402-2.969	9. ± 1.	11. ± 2.	8. ± 1.	6.8 ± 0.9	9. ± 1.
2.969-3.670	5.5 ± 0.8	5.9 ± 0.9	5.2 ± 0.9	6. ± 1.	7. ± 1.
3.670-4.537	3.9 ± 0.7	3.3 ± 0.5	3.1 ± 0.4	3.1 ± 0.6	4.0 ± 0.8
4.537-5.608	2.5 ± 0.5	1.9 ± 0.3	1.9 ± 0.3	1.9 ± 0.4	1.9 ± 0.4
5.608-6.931	1.1 ± 0.2	1.1 ± 0.2	1.0 ± 0.2	1.4 ± 0.3	1.5 ± 0.4
6.931-8.568	0.49 ± 0.06	0.67 ± 0.08	0.7 ± 0.2	0.64 ± 0.09	0.6 ± 0.2
8.568-10.59	0.5 ± 0.1	0.32 ± 0.05	0.44 ±0.07	0.5 ± 0.1	0.6 ± 0.2
10.59-13.09	0.19 ± 0.03	0.18 ± 0.03	0.17 ±0.03	0.24 ± 0.04	0.24 ± 0.05
13.09-16.18	0.10 ± 0.02	0.08 ± 0.01	0.09 ±0.02	0.08 ± 0.02	0.13 ± 0.03
16.18-20.00	0.041 ± 0.008	0.048 ± 0.009	0.05 ±0.01	0.05 ± 0.01	0.09 ± 0.02

Table 5: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_μ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-0.5 - -0.4	-0.4 - -0.3	-0.3 - -0.2	-0.2 - -0.1	-0.1 - 0.0
0.100-0.124	4873. ± 264.	5718. ± 325.	6760. ± 419.	6947. ± 556.	9617. ±1241.
0.124-0.153	3934. ± 213.	4006. ± 244.	4059. ± 286.	5222. ± 430.	4250. ± 658.
0.153-0.189	2910. ± 164.	2546. ± 172.	2733. ± 207.	2745. ± 272.	4847. ± 765.
0.189-0.233	1969. ± 121.	1695. ± 124.	1989. ± 159.	1918. ± 203.	2520. ± 441.
0.233-0.289	1391. ± 90.	1398. ± 102.	1343. ± 119.	957. ± 125.	1570. ± 302.
0.289-0.357	949. ± 66.	979. ± 77.	930. ± 87.	857. ± 107.	897. ± 205.
0.357-0.441	635. ± 48.	667. ± 56.	760. ± 71.	647. ± 85.	768. ± 188.
0.441-0.545	462. ± 37.	436. ± 40.	415. ± 45.	389. ± 55.	492. ± 164.
0.545-0.674	305. ± 26.	331. ± 31.	285. ± 33.	201. ± 37.	362. ± 112.
0.674-0.833	194. ± 19.	193. ± 21.	181. ± 24.	202. ± 33.	135. ± 33.
0.833-1.029	140. ± 14.	145. ± 16.	112. ± 16.	96. ± 19.	138. ± 48.
1.029-1.272	86. ± 10.	76. ± 10.	82. ± 12.	50. ± 10.	37. ± 11.
1.272-1.572	63. ± 8.	50. ± 7.	52. ± 9.	57. ± 12.	17. ± 4.
1.572-1.943	29. ± 4.	35. ± 5.	40. ± 7.	31. ± 8.	10. ± 5.
1.943-2.402	15. ± 2.	22. ± 4.	22. ± 5.	17. ± 4.	41. ± 22.
2.402-2.969	7. ± 1.	11. ± 2.	15. ± 3.	11. ± 3.	5. ± 1.
2.969-3.670	11. ± 2.	9. ± 2.	10. ± 2.	9. ± 2.	9. ± 5.
3.670-4.537	3.2 ± 0.6	5. ± 1.	2.3 ± 0.4	3.3 ± 0.6	4. ± 1.
4.537-5.608	2.7 ± 0.6	3.4 ± 0.8	2.2 ± 0.7	2.2 ± 0.5	2.0 ± 0.8
5.608-6.931	0.9 ± 0.1	1.1 ± 0.2	1.6 ± 0.5	1.3 ± 0.3	1.3 ± 0.5
6.931-8.568	0.7 ± 0.1	0.27 ± 0.05	1.9 ± 0.8	0.37 ± 0.09	0.5 ± 0.2
8.568-10.59	0.34 ± 0.06	0.5 ± 0.1	0.37 ± 0.09	0.7 ± 0.2	0.7 ± 0.3
10.59-13.09	0.17 ± 0.04	0.19 ± 0.04	0.13 ± 0.03	0.16 ± 0.04	0.1 ± 0.1
13.09-16.18	0.09 ± 0.02	0.09 ± 0.02	0.19 ± 0.04	0.18 ± 0.06	0.05 ± 0.02
16.18-20.00	0.05 ± 0.01	0.07 ± 0.03	0.08 ± 0.02	0.04 ± 0.02	0.0 ± 0.0

Table 6: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_μ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.0 - 0.1	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4	0.4 - 0.5
0.100-0.124	7237. ±1076.	6454. ± 524.	4345. ± 327.	4001. ± 269.	3978. ± 235.
0.124-0.153	5158. ± 746.	4258. ± 389.	2575. ± 221.	3048. ± 209.	2605. ± 168.
0.153-0.189	4365. ± 723.	3370. ± 306.	2539. ± 203.	1913. ± 147.	2204. ± 140.
0.189-0.233	2649. ± 432.	1691. ± 193.	1700. ± 147.	1498. ± 116.	1524. ± 104.
0.233-0.289	1144. ± 258.	1043. ± 130.	1203. ± 111.	1067. ± 87.	1126. ± 79.
0.289-0.357	898. ± 199.	960. ± 117.	789. ± 80.	696. ± 61.	804. ± 60.
0.357-0.441	675. ± 177.	637. ± 84.	528. ± 57.	617. ± 54.	534. ± 43.
0.441-0.545	746. ± 189.	451. ± 64.	431. ± 49.	380. ± 36.	477. ± 37.
0.545-0.674	351. ± 106.	243. ± 40.	226. ± 31.	238. ± 25.	319. ± 27.
0.674-0.833	144. ± 38.	198. ± 33.	143. ± 19.	165. ± 19.	202. ± 19.
0.833-1.029	166. ± 51.	114. ± 21.	117. ± 17.	108. ± 13.	119. ± 13.
1.029-1.272	70. ± 24.	84. ± 16.	63. ± 11.	86. ± 11.	73. ± 9.
1.272-1.572	34. ± 16.	33. ± 8.	46. ± 8.	54. ± 8.	51. ± 6.
1.572-1.943	11. ± 3.	35. ± 8.	36. ± 6.	27. ± 5.	22. ± 3.
1.943-2.402	34. ± 22.	20. ± 5.	18. ± 3.	14. ± 2.	16. ± 3.
2.402-2.969	5. ± 1.	11. ± 3.	9. ± 2.	15. ± 3.	12. ± 2.
2.969-3.670	1.9 ± 0.8	9. ± 2.	6. ± 2.	5. ± 1.	4.6 ± 0.9
3.670-4.537	3. ± 1.	7. ± 2.	6. ± 2.	5. ± 1.	2.7 ± 0.5
4.537-5.608	2.1 ± 0.9	1.8 ± 0.5	2.1 ± 0.8	3. ± 1.	1.9 ± 0.4
5.608-6.931	0.9 ± 0.4	1.2 ± 0.3	0.9 ± 0.2	1.2 ± 0.4	1.3 ± 0.4
6.931-8.568	0.12 ± 0.06	0.4 ± 0.1	0.6 ± 0.1	0.32 ± 0.06	0.39 ± 0.06
8.568-10.59	0.6 ± 0.3	0.7 ± 0.2	0.34 ± 0.08	0.30 ± 0.07	0.45 ± 0.09
10.59-13.09	0.1 ± 0.1	0.15 ± 0.05	0.22 ± 0.06	0.19 ± 0.05	0.15 ± 0.04
13.09-16.18	0.06 ± 0.03	0.16 ± 0.07	0.10 ± 0.03	0.08 ± 0.03	0.10 ± 0.03
16.18-20.00	0.05 ± 0.05	0.03 ± 0.02	0.03 ± 0.01	0.021 ± 0.008	0.05 ± 0.01

Table 7: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_μ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.5 - 0.6	0.6 - 0.7	0.7 - 0.8	0.8 - 0.9	0.9 - 1.0
0.100-0.124	3995. ± 214.	3277. ± 177.	3336. ± 165.	3361. ± 157.	3186. ± 144.
0.124-0.153	2931. ± 164.	2565. ± 138.	2735. ± 135.	2708. ± 126.	2664. ± 118.
0.153-0.189	1977. ± 119.	2132. ± 115.	1971. ± 102.	1990. ± 96.	1978. ± 92.
0.189-0.233	1415. ± 90.	1656. ± 91.	1598. ± 83.	1549. ± 77.	1543. ± 72.
0.233-0.289	1222. ± 76.	1067. ± 65.	1172. ± 64.	1042. ± 56.	1064. ± 54.
0.289-0.357	788. ± 54.	879. ± 53.	801. ± 47.	861. ± 46.	789. ± 42.
0.357-0.441	577. ± 42.	594. ± 39.	586. ± 36.	559. ± 33.	535. ± 31.
0.441-0.545	406. ± 31.	415. ± 29.	438. ± 28.	383. ± 24.	395. ± 23.
0.545-0.674	306. ± 24.	265. ± 21.	292. ± 20.	264. ± 18.	225. ± 16.
0.674-0.833	207. ± 17.	185. ± 16.	189. ± 15.	185. ± 14.	156. ± 12.
0.833-1.029	133. ± 13.	136. ± 12.	110. ± 10.	123. ± 10.	117. ± 9.
1.029-1.272	74. ± 8.	67. ± 7.	78. ± 7.	73. ± 7.	66. ± 6.
1.272-1.572	59. ± 7.	49. ± 5.	46. ± 5.	43. ± 4.	34. ± 4.
1.572-1.943	33. ± 4.	41. ± 5.	26. ± 3.	27. ± 3.	29. ± 3.
1.943-2.402	20. ± 3.	21. ± 3.	13. ± 2.	19. ± 2.	16. ± 2.
2.402-2.969	9. ± 1.	11. ± 2.	13. ± 2.	9. ± 1.	9. ± 1.
2.969-3.670	4.6 ± 0.9	4.9 ± 0.8	4.6 ± 0.8	7. ± 1.	4.4 ± 0.7
3.670-4.537	3.2 ± 0.7	5.3 ± 0.9	3.3 ± 0.6	3.9 ± 0.7	2.1 ± 0.3
4.537-5.608	2.0 ± 0.4	1.7 ± 0.3	2.7 ± 0.5	1.9 ± 0.4	1.6 ± 0.3
5.608-6.931	0.8 ± 0.1	1.6 ± 0.4	0.8 ± 0.1	1.0 ± 0.2	0.70 ± 0.08
6.931-8.568	0.50 ± 0.08	0.55 ± 0.08	0.38 ± 0.06	0.5 ± 0.1	0.43 ± 0.06
8.568-10.59	0.40 ± 0.07	0.52 ± 0.08	0.4 ± 0.1	0.34 ± 0.05	0.32 ± 0.05
10.59-13.09	0.14 ± 0.03	0.14 ± 0.02	0.15 ± 0.03	0.24 ± 0.09	0.20 ± 0.03
13.09-16.18	0.10 ± 0.03	0.13 ± 0.03	0.09 ± 0.02	0.10 ± 0.02	0.09 ± 0.02
16.18-20.00	0.04 ± 0.02	0.05 ± 0.01	0.044 ± 0.009	0.05 ± 0.01	0.040 ± 0.007

Table 8: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_e$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-1.0 - -0.9	-0.9 - -0.8	-0.8 - -0.7	-0.7 - -0.6	-0.6 - -0.5
0.100-0.124	1454. ± 99.	1588. ± 110.	2001. ± 133.	1767. ± 133.	2104. ± 158.
0.124-0.153	1114. ± 78.	1234. ± 86.	1297. ± 95.	1594. ± 113.	1256. ± 108.
0.153-0.189	884. ± 62.	845. ± 64.	1017. ± 76.	1060. ± 83.	1017. ± 88.
0.189-0.233	723. ± 50.	702. ± 52.	913. ± 65.	763. ± 62.	812. ± 70.
0.233-0.289	451. ± 36.	537. ± 41.	537. ± 44.	567. ± 49.	512. ± 50.
0.289-0.357	330. ± 27.	344. ± 29.	398. ± 34.	332. ± 33.	378. ± 38.
0.357-0.441	224. ± 20.	272. ± 24.	255. ± 24.	264. ± 26.	274. ± 29.
0.441-0.545	130. ± 14.	147. ± 15.	157. ± 17.	165. ± 18.	163. ± 20.
0.545-0.674	118. ± 12.	124. ± 13.	98. ± 12.	93. ± 12.	98. ± 13.
0.674-0.833	58. ± 7.	69. ± 8.	61. ± 8.	81. ± 10.	71. ± 10.
0.833-1.029	35. ± 5.	38. ± 6.	40. ± 6.	45. ± 7.	42. ± 7.
1.029-1.272	22. ± 3.	27. ± 4.	24. ± 4.	25. ± 5.	29. ± 5.
1.272-1.572	11. ± 2.	18. ± 3.	22. ± 4.	12. ± 3.	20. ± 4.
1.572-1.943	11. ± 2.	4. ± 1.	5. ± 1.	7. ± 2.	9. ± 2.
1.943-2.402	4. ± 1.	3.7 ± 0.9	4. ± 1.	7. ± 2.	7. ± 2.
2.402-2.969	1.4 ± 0.4	1.9 ± 0.6	3.4 ± 0.9	2.2 ± 0.7	6. ± 2.
2.969-3.670	1.3 ± 0.4	1.1 ± 0.4	2.4 ± 0.8	1.6 ± 0.4	3. ± 1.
3.670-4.537	0.22 ± 0.06	0.6 ± 0.1	1.5 ± 0.5	0.7 ± 0.3	1.0 ± 0.4
4.537-5.608	0.3 ± 0.2	0.20 ± 0.05	0.5 ± 0.2	0.5 ± 0.2	0.37 ± 0.08
5.608-6.931	0.3 ± 0.1	0.25 ± 0.06	0.24 ± 0.07	0.3 ± 0.2	0.29 ± 0.09
6.931-8.568	0.14 ± 0.04	0.05 ± 0.02	0.12 ± 0.04	0.07 ± 0.03	0.09 ± 0.03
8.568-10.59	0.04 ± 0.02	0.04 ± 0.02	0.021 ± 0.009	0.05 ± 0.02	0.2 ± 0.2
10.59-13.09	0.004 ± 0.004	0.03 ± 0.02	0.04 ± 0.02	0.020 ± 0.009	0.04 ± 0.02
13.09-16.18	0.009 ± 0.005	0.011 ± 0.005	0.006 ± 0.003	0.016 ± 0.008	0.020 ± 0.009
16.18-20.00	0.004 ± 0.002	0.009 ± 0.005	0.009 ± 0.005	0.005 ± 0.003	0.007 ± 0.004

Table 9: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_e$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-0.5 - -0.4	-0.4 - -0.3	-0.3 - -0.2	-0.2 - -0.1	-0.1 - 0.0
0.100-0.124	2032. ± 170.	1743. ± 176.	1978. ± 225.	2502. ± 337.	3178. ± 689.
0.124-0.153	1300. ± 121.	1338. ± 139.	844. ± 121.	2015. ± 264.	2518. ± 511.
0.153-0.189	1024. ± 96.	898. ± 100.	1109. ± 136.	1072. ± 163.	946. ± 293.
0.189-0.233	749. ± 75.	735. ± 82.	590. ± 83.	778. ± 131.	1075. ± 346.
0.233-0.289	574. ± 58.	436. ± 57.	570. ± 78.	640. ± 110.	489. ± 199.
0.289-0.357	507. ± 50.	441. ± 51.	398. ± 59.	409. ± 74.	203. ± 72.
0.357-0.441	292. ± 33.	298. ± 39.	200. ± 35.	266. ± 55.	121. ± 46.
0.441-0.545	175. ± 23.	133. ± 21.	182. ± 31.	207. ± 43.	207. ± 67.
0.545-0.674	141. ± 18.	124. ± 19.	142. ± 25.	130. ± 29.	113. ± 39.
0.674-0.833	97. ± 14.	70. ± 13.	85. ± 16.	100. ± 23.	62. ± 24.
0.833-1.029	36. ± 6.	75. ± 12.	63. ± 13.	41. ± 11.	34. ± 16.
1.029-1.272	23. ± 4.	32. ± 7.	34. ± 8.	41. ± 12.	9. ± 3.
1.272-1.572	20. ± 4.	23. ± 5.	24. ± 6.	21. ± 6.	10. ± 3.
1.572-1.943	11. ± 3.	17. ± 4.	7. ± 2.	11. ± 5.	45. ± 28.
1.943-2.402	4. ± 1.	8. ± 2.	9. ± 2.	5. ± 1.	3. ± 1.
2.402-2.969	5. ± 1.	3. ± 1.	4. ± 2.	3.3 ± 0.9	4. ± 3.
2.969-3.670	1.6 ± 0.6	1.7 ± 0.7	3. ± 1.	1.8 ± 0.4	1.0 ± 0.5
3.670-4.537	0.8 ± 0.2	4. ± 1.	1.0 ± 0.2	4. ± 2.	0.9 ± 0.4
4.537-5.608	1.1 ± 0.5	0.9 ± 0.2	0.7 ± 0.2	1.1 ± 0.3	0.1 ± 0.1
5.608-6.931	0.16 ± 0.07	0.24 ± 0.06	0.3 ± 0.1	0.4 ± 0.1	0.3 ± 0.2
6.931-8.568	0.06 ± 0.02	0.11 ± 0.03	0.3 ± 0.1	0.21 ± 0.08	0.9 ± 0.5
8.568-10.59	0.06 ± 0.02	0.03 ± 0.02	0.12 ± 0.06	0.10 ± 0.04	2. ± 1.
10.59-13.09	0.03 ± 0.01	0.013 ± 0.007	0.12 ± 0.05	0.09 ± 0.03	0.05 ± 0.03
13.09-16.18	0.016 ± 0.007	0.03 ± 0.01	0.03 ± 0.01	0.05 ± 0.02	0.02 ± 0.02
16.18-20.00	0.03 ± 0.02	0.002 ± 0.002	0.012 ± 0.008	0.03 ± 0.01	0.0 ± 0.0

Table 10: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_e$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.0 - 0.1	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4	0.4 - 0.5
0.100-0.124	2464. ± 639.	1898. ± 281.	1938. ± 221.	1095. ± 133.	1389. ± 139.
0.124-0.153	2344. ± 493.	1846. ± 248.	1241. ± 158.	962. ± 114.	1076. ± 108.
0.153-0.189	1090. ± 288.	918. ± 155.	747. ± 108.	897. ± 100.	664. ± 76.
0.189-0.233	1105. ± 352.	565. ± 104.	545. ± 79.	663. ± 77.	614. ± 65.
0.233-0.289	661. ± 215.	582. ± 99.	338. ± 54.	379. ± 50.	414. ± 47.
0.289-0.357	70. ± 16.	331. ± 62.	388. ± 57.	353. ± 44.	311. ± 36.
0.357-0.441	163. ± 59.	265. ± 56.	265. ± 40.	276. ± 36.	244. ± 29.
0.441-0.545	259. ± 78.	204. ± 42.	100. ± 21.	136. ± 21.	158. ± 21.
0.545-0.674	97. ± 33.	162. ± 36.	91. ± 18.	110. ± 18.	119. ± 16.
0.674-0.833	40. ± 14.	73. ± 20.	64. ± 14.	67. ± 12.	67. ± 11.
0.833-1.029	15. ± 5.	32. ± 11.	48. ± 11.	53. ± 10.	45. ± 8.
1.029-1.272	16. ± 10.	31. ± 10.	14. ± 3.	44. ± 8.	24. ± 5.
1.272-1.572	11. ± 3.	23. ± 8.	31. ± 7.	14. ± 4.	24. ± 5.
1.572-1.943	40. ± 27.	14. ± 6.	12. ± 3.	18. ± 4.	9. ± 2.
1.943-2.402	10. ± 6.	6. ± 1.	7. ± 2.	4. ± 2.	6. ± 2.
2.402-2.969	9. ± 5.	6. ± 2.	3.6 ± 0.7	6. ± 2.	2.3 ± 0.4
2.969-3.670	1.8 ± 0.7	1.1 ± 0.3	1.1 ± 0.3	3. ± 1.	1.8 ± 0.6
3.670-4.537	0.3 ± 0.1	1.2 ± 0.3	1.1 ± 0.3	0.9 ± 0.2	1.0 ± 0.5
4.537-5.608	0.1 ± 0.1	1.0 ± 0.3	0.9 ± 0.2	0.9 ± 0.5	0.4 ± 0.1
5.608-6.931	0.4 ± 0.2	0.8 ± 0.3	0.16 ± 0.06	0.18 ± 0.09	0.25 ± 0.08
6.931-8.568	0.5 ± 0.5	0.25 ± 0.09	0.2 ± 0.1	0.10 ± 0.03	0.19 ± 0.06
8.568-10.59	2. ± 1.	0.11 ± 0.05	0.08 ± 0.06	0.016 ± 0.009	0.06 ± 0.02
10.59-13.09	0.05 ± 0.03	0.08 ± 0.05	0.04 ± 0.03	0.03 ± 0.01	0.003 ± 0.002
13.09-16.18	0.02 ± 0.02	0.09 ± 0.06	0.04 ± 0.02	0.019 ± 0.008	0.010 ± 0.007
16.18-20.00	0.0 ± 0.0	0.002 ± 0.002	0.04 ± 0.03	0.004 ± 0.003	0.011 ± 0.005

Table 11: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_e$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.5 - 0.6	0.6 - 0.7	0.7 - 0.8	0.8 - 0.9	0.9 - 1.0
0.100-0.124	1249. ± 117.	1463. ± 119.	1224. ± 101.	1223. ± 95.	1306. ± 93.
0.124-0.153	1004. ± 95.	860. ± 79.	957. ± 80.	726. ± 64.	951. ± 71.
0.153-0.189	796. ± 76.	644. ± 61.	750. ± 64.	791. ± 62.	668. ± 53.
0.189-0.233	586. ± 57.	522. ± 51.	567. ± 49.	534. ± 45.	505. ± 42.
0.233-0.289	438. ± 45.	431. ± 41.	368. ± 36.	379. ± 34.	391. ± 33.
0.289-0.357	341. ± 36.	285. ± 30.	322. ± 30.	320. ± 28.	246. ± 23.
0.357-0.441	245. ± 28.	197. ± 22.	173. ± 19.	245. ± 23.	227. ± 20.
0.441-0.545	176. ± 21.	165. ± 18.	131. ± 15.	134. ± 14.	119. ± 13.
0.545-0.674	105. ± 14.	91. ± 12.	101. ± 12.	102. ± 12.	95. ± 11.
0.674-0.833	80. ± 11.	70. ± 10.	68. ± 9.	62. ± 8.	49. ± 7.
0.833-1.029	38. ± 7.	36. ± 6.	49. ± 7.	36. ± 5.	37. ± 5.
1.029-1.272	36. ± 6.	24. ± 4.	25. ± 4.	17. ± 3.	27. ± 4.
1.272-1.572	16. ± 3.	19. ± 3.	11. ± 2.	15. ± 3.	7. ± 1.
1.572-1.943	12. ± 3.	10. ± 2.	6. ± 1.	10. ± 2.	6. ± 1.
1.943-2.402	5. ± 2.	8. ± 2.	4. ± 1.	5. ± 1.	2.8 ± 0.6
2.402-2.969	4. ± 1.	4. ± 1.	4. ± 1.	2.4 ± 0.7	1.9 ± 0.6
2.969-3.670	2.2 ± 0.7	2.2 ± 0.7	2.8 ± 0.9	0.7 ± 0.3	1.2 ± 0.5
3.670-4.537	0.5 ± 0.1	1.0 ± 0.3	0.7 ± 0.3	0.6 ± 0.3	0.7 ± 0.3
4.537-5.608	0.5 ± 0.3	0.5 ± 0.2	0.30 ± 0.08	0.21 ± 0.06	0.14 ± 0.04
5.608-6.931	0.27 ± 0.08	0.09 ± 0.04	0.13 ± 0.05	0.2 ± 0.2	0.09 ± 0.02
6.931-8.568	0.15 ± 0.05	0.16 ± 0.05	0.09 ± 0.04	0.06 ± 0.02	0.07 ± 0.03
8.568-10.59	0.04 ± 0.02	0.05 ± 0.01	0.04 ± 0.01	0.02 ± 0.02	0.03 ± 0.01
10.59-13.09	0.007 ± 0.003	0.018 ± 0.009	0.03 ± 0.01	0.010 ± 0.005	0.03 ± 0.02
13.09-16.18	0.013 ± 0.006	0.019 ± 0.006	0.012 ± 0.005	0.006 ± 0.004	0.008 ± 0.005
16.18-20.00	0.005 ± 0.004	0.006 ± 0.004	0.002 ± 0.002	0.001 ± 0.001	0.0 ± 0.0

Table 12: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_\mu$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-1.0 - -0.9	-0.9 - -0.8	-0.8 - -0.7	-0.7 - -0.6	-0.6 - -0.5
0.100-0.124	4351. ± 172.	4784. ± 191.	5514. ± 219.	5625. ± 239.	4928. ± 243.
0.124-0.153	3755. ± 144.	3660. ± 150.	3655. ± 160.	3831. ± 176.	3590. ± 183.
0.153-0.189	2725. ± 110.	2654. ± 114.	2921. ± 128.	2906. ± 137.	3009. ± 153.
0.189-0.233	1966. ± 83.	2113. ± 92.	2256. ± 101.	2236. ± 109.	1987. ± 109.
0.233-0.289	1439. ± 64.	1344. ± 65.	1499. ± 73.	1585. ± 82.	1459. ± 85.
0.289-0.357	981. ± 47.	909. ± 48.	1020. ± 54.	1089. ± 60.	1108. ± 66.
0.357-0.441	655. ± 34.	698. ± 38.	774. ± 43.	719. ± 44.	630. ± 44.
0.441-0.545	423. ± 24.	482. ± 28.	453. ± 29.	456. ± 31.	482. ± 34.
0.545-0.674	301. ± 19.	305. ± 19.	312. ± 21.	294. ± 22.	318. ± 25.
0.674-0.833	195. ± 13.	202. ± 14.	201. ± 15.	186. ± 15.	177. ± 16.
0.833-1.029	107. ± 8.	133. ± 10.	132. ± 11.	127. ± 11.	104. ± 11.
1.029-1.272	67. ± 6.	78. ± 7.	58. ± 6.	81. ± 8.	77. ± 8.
1.272-1.572	48. ± 4.	36. ± 4.	51. ± 5.	50. ± 6.	54. ± 7.
1.572-1.943	26. ± 3.	23. ± 3.	29. ± 3.	25. ± 3.	23. ± 3.
1.943-2.402	18. ± 2.	13. ± 2.	18. ± 2.	16. ± 2.	18. ± 3.
2.402-2.969	10. ± 1.	8. ± 1.	10. ± 2.	9. ± 1.	11. ± 2.
2.969-3.670	5.3 ± 0.8	5.0 ± 0.9	7. ± 1.	5.9 ± 0.9	5. ± 1.
3.670-4.537	3.0 ± 0.5	3.5 ± 0.6	3. ± 0.4	2.5 ± 0.3	2.9 ± 0.7
4.537-5.608	2.1 ± 0.4	2.5 ± 0.5	1. ± 0.2	2.2 ± 0.5	2.0 ± 0.5
5.608-6.931	0.71 ± 0.09	0.9 ± 0.2	0.9 ± 0.2	0.6 ± 0.1	0.7 ± 0.1
6.931-8.568	0.5 ± 0.1	0.8 ± 0.2	0.5 ± 0.1	0.7 ± 0.2	0.8 ± 0.2
8.568-10.59	0.22 ± 0.03	0.26 ± 0.04	0.3 ± 0.05	0.6 ± 0.2	0.21 ± 0.04
10.59-13.09	0.15 ± 0.02	0.16 ± 0.02	0.2 ± 0.03	0.14 ± 0.03	0.13 ± 0.02
13.09-16.18	0.06 ± 0.01	0.09 ± 0.02	0.07 ± 0.01	0.07 ± 0.01	0.09 ± 0.02
16.18-20.00	0.041 ± 0.008	0.031 ± 0.006	0.05 ± 0.01	0.04 ± 0.01	0.027 ± 0.007

Table 13: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_\mu$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	-0.5 - -0.4	-0.4 - -0.3	-0.3 - -0.2	-0.2 - -0.1	-0.1 - 0.0
0.100-0.124	4970. ± 267.	5491. ± 317.	5335. ± 370.	6868. ± 554.	8253. ±1101.
0.124-0.153	3277. ± 192.	3995. ± 245.	4531. ± 310.	4197. ± 387.	6055. ± 887.
0.153-0.189	2939. ± 164.	2690. ± 177.	3087. ± 228.	3548. ± 308.	3014. ± 484.
0.189-0.233	1926. ± 120.	2146. ± 143.	1994. ± 160.	2174. ± 215.	2242. ± 451.
0.233-0.289	1373. ± 90.	1464. ± 106.	1505. ± 126.	1113. ± 140.	1405. ± 269.
0.289-0.357	991. ± 69.	936. ± 73.	886. ± 86.	867. ± 111.	1162. ± 239.
0.357-0.441	634. ± 48.	634. ± 54.	667. ± 67.	673. ± 87.	557. ± 119.
0.441-0.545	478. ± 37.	320. ± 33.	328. ± 39.	344. ± 52.	288. ± 73.
0.545-0.674	337. ± 28.	273. ± 27.	252. ± 31.	329. ± 46.	226. ± 55.
0.674-0.833	173. ± 18.	192. ± 21.	206. ± 26.	222. ± 37.	160. ± 37.
0.833-1.029	133. ± 14.	129. ± 16.	99. ± 15.	111. ± 20.	68. ± 21.
1.029-1.272	104. ± 11.	69. ± 10.	53. ± 9.	59. ± 13.	53. ± 17.
1.272-1.572	49. ± 6.	61. ± 8.	42. ± 8.	52. ± 10.	45. ± 15.
1.572-1.943	29. ± 4.	26. ± 4.	35. ± 7.	30. ± 8.	13. ± 5.
1.943-2.402	15. ± 2.	21. ± 4.	35. ± 6.	15. ± 4.	19. ± 6.
2.402-2.969	13. ± 2.	8. ± 2.	14. ± 3.	12. ± 3.	6. ± 2.
2.969-3.670	10. ± 2.	7. ± 1.	7. ± 2.	3. ± 0.5	4. ± 1.
3.670-4.537	2.6 ± 0.6	4. ± 1.	4. ± 1.	3. ± 0.6	3. ± 1.
4.537-5.608	1.5 ± 0.4	2.4 ± 0.6	2.2 ± 0.7	3. ± 1.	12. ± 9.
5.608-6.931	1.3 ± 0.4	1.5 ± 0.5	1.8 ± 0.8	4. ± 2.	1.2 ± 0.5
6.931-8.568	1.3 ± 0.3	0.5 ± 0.1	0.8 ± 0.2	0.7 ± 0.2	1.0 ± 0.3
8.568-10.59	0.29 ± 0.04	0.27 ± 0.06	0.5 ± 0.1	0.5 ± 0.1	0.5 ± 0.2
10.59-13.09	0.17 ± 0.03	0.20 ± 0.05	0.20 ± 0.05	0.23 ± 0.06	0.23 ± 0.09
13.09-16.18	0.14 ± 0.04	0.09 ± 0.02	0.12 ± 0.03	0.13 ± 0.07	0.04 ± 0.02
16.18-20.00	0.06 ± 0.02	0.05 ± 0.02	0.04 ± 0.01	0.05 ± 0.02	0.02 ± 0.02

Table 14: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_\mu$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.0 - 0.1	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4	0.4 - 0.5
0.100-0.124	7991. ±1126.	5792. ± 501.	4654. ± 346.	3809. ± 261.	3839. ± 229.
0.124-0.153	6636. ± 948.	4376. ± 399.	2885. ± 239.	3025. ± 210.	2592. ± 168.
0.153-0.189	3097. ± 426.	2901. ± 284.	2556. ± 204.	1852. ± 142.	2175. ± 140.
0.189-0.233	2264. ± 419.	1586. ± 179.	1507. ± 136.	1637. ± 124.	1451. ± 100.
0.233-0.289	1234. ± 248.	1262. ± 148.	1234. ± 115.	1093. ± 89.	1079. ± 77.
0.289-0.357	867. ± 211.	709. ± 93.	781. ± 76.	917. ± 74.	848. ± 62.
0.357-0.441	645. ± 126.	548. ± 76.	490. ± 56.	570. ± 51.	538. ± 44.
0.441-0.545	296. ± 71.	374. ± 55.	423. ± 46.	405. ± 39.	442. ± 36.
0.545-0.674	174. ± 40.	222. ± 36.	271. ± 34.	248. ± 26.	251. ± 24.
0.674-0.833	189. ± 47.	136. ± 27.	173. ± 24.	205. ± 22.	171. ± 17.
0.833-1.029	110. ± 44.	148. ± 27.	91. ± 14.	112. ± 14.	110. ± 12.
1.029-1.272	49. ± 16.	48. ± 10.	86. ± 13.	73. ± 10.	75. ± 9.
1.272-1.572	29. ± 9.	63. ± 12.	54. ± 9.	43. ± 7.	38. ± 5.
1.572-1.943	27. ± 11.	26. ± 7.	27. ± 5.	21. ± 4.	29. ± 4.
1.943-2.402	13. ± 4.	18. ± 5.	19. ± 4.	13. ± 3.	16. ± 3.
2.402-2.969	8. ± 3.	12. ± 2.	10. ± 2.	12. ± 2.	9. ± 2.
2.969-3.670	4. ± 1.	7. ± 2.	5. ± 1.	6. ± 1.	5. ± 1.
3.670-4.537	2. ± 1.	6. ± 2.	3. ± 1.	4. ± 1.	2.8 ± 0.7
4.537-5.608	12. ± 9.	4. ± 2.	1.6 ± 0.3	2.4 ± 0.8	2.2 ± 0.6
5.608-6.931	1.0 ± 0.4	0.9 ± 0.3	1.0 ± 0.2	1.6 ± 0.6	0.8 ± 0.1
6.931-8.568	0.7 ± 0.3	2. ± 1.	0.6 ± 0.1	0.5 ± 0.1	0.47 ± 0.09
8.568-10.59	0.19 ± 0.08	0.25 ± 0.08	0.4 ± 0.1	0.31 ± 0.08	0.28 ± 0.05
10.59-13.09	0.09 ± 0.04	0.13 ± 0.05	0.19 ± 0.06	0.13 ± 0.05	0.14 ± 0.03
13.09-16.18	0.06 ± 0.03	0.17 ± 0.07	0.10 ± 0.03	0.04 ± 0.01	0.12 ± 0.03
16.18-20.00	0.02 ± 0.01	0.03 ± 0.01	0.06 ± 0.02	0.04 ± 0.01	0.05 ± 0.01

Table 15: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	$\bar{\nu}_\mu$ FLUX ($m^{-2}s^{-1}sr^{-1}GeV^{-1}$)				
E_ν (GeV) \ cos(zenith)	0.5 - 0.6	0.6 - 0.7	0.7 - 0.8	0.8 - 0.9	0.9 - 1.0
0.100-0.124	3722. ± 205.	3294. ± 177.	3340. ± 166.	3059. ± 149.	2685. ± 130.
0.124-0.153	2504. ± 149.	2454. ± 136.	2639. ± 133.	2485. ± 120.	2434. ± 113.
0.153-0.189	1848. ± 114.	1758. ± 103.	1940. ± 101.	1921. ± 96.	1839. ± 88.
0.189-0.233	1709. ± 100.	1532. ± 87.	1344. ± 75.	1445. ± 75.	1540. ± 73.
0.233-0.289	992. ± 67.	1049. ± 65.	1121. ± 62.	1116. ± 59.	943. ± 51.
0.289-0.357	847. ± 56.	778. ± 50.	869. ± 49.	780. ± 44.	674. ± 38.
0.357-0.441	560. ± 41.	596. ± 39.	583. ± 36.	543. ± 33.	498. ± 30.
0.441-0.545	408. ± 31.	369. ± 27.	332. ± 24.	335. ± 23.	344. ± 22.
0.545-0.674	246. ± 21.	256. ± 20.	264. ± 19.	238. ± 17.	238. ± 16.
0.674-0.833	180. ± 16.	193. ± 16.	194. ± 15.	154. ± 12.	149. ± 12.
0.833-1.029	125. ± 12.	126. ± 11.	100. ± 9.	119. ± 10.	98. ± 8.
1.029-1.272	76. ± 8.	79. ± 8.	74. ± 7.	75. ± 7.	74. ± 6.
1.272-1.572	50. ± 6.	33. ± 4.	46. ± 5.	41. ± 4.	40. ± 4.
1.572-1.943	32. ± 4.	35. ± 4.	24. ± 3.	25. ± 3.	19. ± 2.
1.943-2.402	23. ± 3.	15. ± 2.	17. ± 2.	15. ± 2.	13. ± 2.
2.402-2.969	11. ± 2.	13. ± 2.	9. ± 1.	10. ± 1.	8. ± 1.
2.969-3.670	5. ± 1.	4.3 ± 0.8	3.8 ± 0.6	7. ± 1.	3.4 ± 0.6
3.670-4.537	2.9 ± 0.7	3.1 ± 0.5	2.8 ± 0.6	2.9 ± 0.5	2.5 ± 0.4
4.537-5.608	1.3 ± 0.2	2.3 ± 0.5	1.5 ± 0.3	1.8 ± 0.4	1.2 ± 0.1
5.608-6.931	1.2 ± 0.3	1.2 ± 0.2	1.2 ± 0.3	0.8 ± 0.2	0.47 ± 0.07
6.931-8.568	0.47 ± 0.09	0.49 ± 0.08	0.6 ± 0.2	0.6 ± 0.1	0.40 ± 0.06
8.568-10.59	0.21 ± 0.05	0.38 ± 0.07	0.18 ± 0.03	0.3 ± 0.1	0.24 ± 0.04
10.59-13.09	0.15 ± 0.03	0.19 ± 0.04	0.14 ± 0.03	0.10 ± 0.02	0.14 ± 0.02
13.09-16.18	0.07 ± 0.02	0.07 ± 0.01	0.07 ± 0.02	0.05 ± 0.01	0.07 ± 0.01
16.18-20.00	0.04 ± 0.01	0.014 ± 0.005	0.05 ± 0.01	0.04 ± 0.01	0.036 ± 0.008

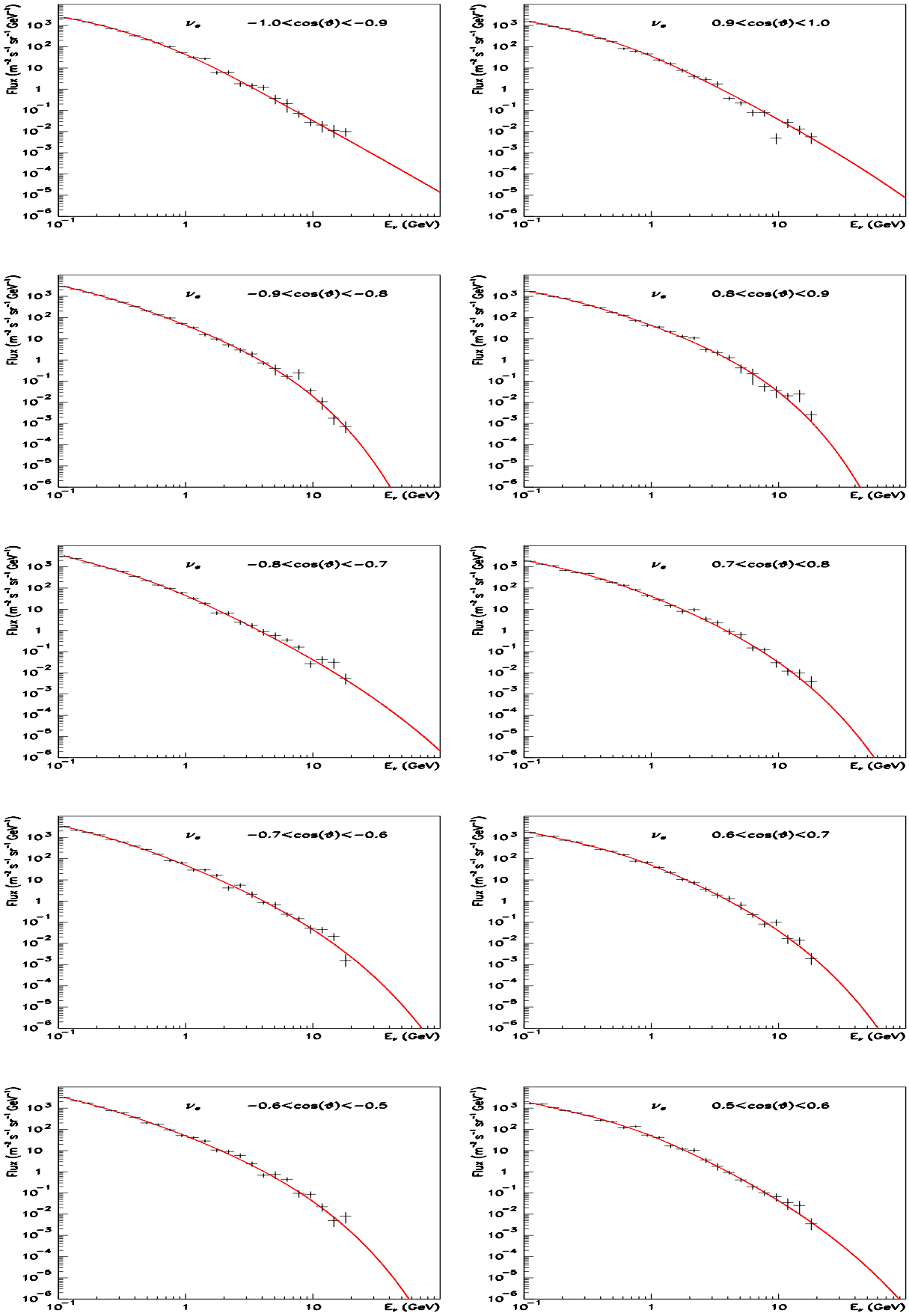
Table 16: *Neutrino flux calculated for Super-Kamiokande experiment location.*

	ν_e					$\bar{\nu}_e$				
cos(zenith)	c_1	c_2	c_3	c_4	c_5	c_1	c_2	c_3	c_4	c_5
-1.0 $\sim$ -0.9	158.44	-0.60800	1.8396	0.18741	-3.0168	89.726	-0.79006	2.9960	0.34141	-2.5694
-0.9 $\sim$ -0.8	117.70	-1.0549	13.017	0.67558	-1.7271	112.60	-0.70869	2.2114	0.28367	-2.7859
-0.8 $\sim$ -0.7	125.66	-0.80132	3.9573	0.42986	-2.3150	86.664	-0.88612	6.4771	0.39793	-2.0761
-0.7 $\sim$ -0.6	130.94	-0.84786	7.0852	0.54907	-1.9297	90.046	-0.91557	7.2732	0.52376	-1.9031
-0.6 $\sim$ -0.5	133.60	-0.66703	7.6872	0.60534	-1.7756	111.98	-0.74825	3.5262	0.45695	-2.0766
-0.5 $\sim$ -0.4	132.84	-0.86050	5.7500	0.49728	-2.0201	261.69	-0.48811	0.83483	0.10263	-3.3177
-0.4 $\sim$ -0.3	129.90	0.34385	2.4619	0.57282	-1.4682	130.50	-0.37636	3.3819	0.68576	-1.4751
-0.3 $\sim$ -0.2	192.56	-0.70587	2.6676	0.47117	-2.1181	180.15	-0.60032	1.6555	0.20392	-2.6258
-0.2 $\sim$ -0.1	112.02	-0.51347	4.2519	0.14164	-2.4820	115.52	-0.53140	3.1500	0.15614	-2.3807
-0.1 $\sim$ 0.0	58.564	5.8504	4.9865	0.39698	-1.4188	54.615	-0.23863	1.8834	0.08176	-2.5337
0.0 $\sim$ 0.1	61.352	7.0397	4.9339	0.47300	-1.3595	367.05	-0.37364	0.22741	0.0003989	-3.4242
0.1 $\sim$ 0.2	174.61	-0.45175	1.6774	0.06328	-2.7968	109.38	-0.63786	4.1845	0.54371	-1.8178
0.2 $\sim$ 0.3	136.73	-0.42838	4.7653	0.58185	-1.6367	119.86	-0.52770	1.5443	0.15386	-2.6644
0.3 $\sim$ 0.4	109.25	-1.0526	7.7228	0.48298	-1.9665	177.77	-0.56693	1.2763	0.16647	-3.0705
0.4 $\sim$ 0.5	210.77	-0.79235	2.0286	0.54385	-2.1010	142.21	-0.69189	1.9083	0.29079	-2.6352
0.5 $\sim$ 0.6	151.85	-0.86084	2.9725	0.48787	-2.2120	141.18	-0.77367	2.1573	0.36997	-2.5576
0.6 $\sim$ 0.7	139.23	-0.87656	3.9773	0.58493	-1.8871	217.39	-0.52035	0.93339	0.13544	-3.1456
0.7 $\sim$ 0.8	112.10	-0.87348	5.3640	0.59642	-1.8436	99.381	-0.84456	3.1460	0.48951	-2.1426
0.8 $\sim$ 0.9	115.84	-0.95680	11.016	0.67553	-1.5199	199.50	-0.50385	0.84888	0.11759	-3.4074
0.9 $\sim$ 1.0	113.89	-0.77435	2.6852	0.34637	-2.5275	101.89	-0.67154	1.7903	0.26523	-2.9049

Table 17: *Fitting parameters for simulated neutrino spectra around Super-Kamiokande detector.*

	ν_μ					$\bar{\nu}_\mu$				
cos(zenith)	c_1	c_2	c_3	c_4	c_5	c_1	c_2	c_3	c_4	c_5
-1.0 $\sim$ -0.9	305.49	-0.68411	4.4737	0.39840	-1.9528	260.33	-1.0531	9.7759	0.47489	-1.7784
-0.9 $\sim$ -0.8	287.74	-0.66084	7.4471	0.45930	-1.7416	279.01	-0.75194	4.5404	0.36526	-2.0721
-0.8 $\sim$ -0.7	299.83	-0.67686	4.8429	0.37256	-1.9975	281.76	-0.76185	5.4131	0.39050	-1.9954
-0.7 $\sim$ -0.6	272.94	-0.90676	8.0266	0.36361	-1.9673	288.08	-0.73914	4.3034	0.35695	-2.1392
-0.6 $\sim$ -0.5	292.68	-0.56894	3.9778	0.21254	-2.1747	268.18	-0.86900	7.3459	0.46409	-1.8529
-0.5 $\sim$ -0.4	304.82	-0.68285	3.8747	0.35208	-2.0589	418.23	-0.45075	1.4942	0.05794	-2.6731
-0.4 $\sim$ -0.3	347.87	-0.57756	2.8994	0.43622	-1.8799	262.91	-1.0071	18.794	0.48907	-1.6264
-0.3 $\sim$ -0.2	391.82	-0.49189	1.6588	0.13157	-2.5367	215.50	3.1214	4.5299	0.59424	-1.0539
-0.2 $\sim$ -0.1	347.81	-0.49881	1.5272	0.39343	-2.0485	255.11	-0.42650	2.8024	0.098896	-2.4113
-0.1 $\sim$ 0.0	157.71	-0.46926	8.2330	0.030348	-2.5230	164.48	2.3071	4.4337	0.51750	-1.4201
0.0 $\sim$ 0.1	210.17	-0.52198	2.9118	0.11139	-2.7832	194.44	1.5741	6.9985	0.53163	-1.5448
0.1 $\sim$ 0.2	337.93	-0.49214	2.0104	0.44454	-1.9135	235.66	1.3464	7.3909	0.57049	-1.3443
0.2 $\sim$ 0.3	246.22	-0.77543	11.529	0.49052	-1.5943	369.94	-0.44804	1.4384	0.069288	-2.5903
0.3 $\sim$ 0.4	299.52	-0.65078	2.9387	0.48840	-1.8428	263.91	-0.71876	5.1892	0.48522	-1.7562
0.4 $\sim$ 0.5	348.23	-0.63372	2.2373	0.23475	-2.4081	344.90	-0.52594	1.8105	0.12766	-2.5587
0.5 $\sim$ 0.6	394.31	-0.72712	2.2110	0.37504	-2.2364	516.12	-0.49739	1.0884	0.10888	-2.8278
0.6 $\sim$ 0.7	278.53	-0.85252	7.0548	0.48597	-1.6471	266.43	-0.75228	5.9310	0.52838	-1.6250
0.7 $\sim$ 0.8	357.62	-0.53986	1.8553	0.12883	-2.5999	373.27	-0.51470	1.5243	0.11413	-2.6894
0.8 $\sim$ 0.9	272.27	-0.74530	5.0130	0.43656	-1.7816	242.41	-1.0825	11.107	0.54088	-1.5484
0.9 $\sim$ 1.0	324.54	-0.43290	1.5027	0.031346	-2.6918	312.88	-0.44345	1.4021	0.039617	-2.7639

Table 18: *Fitting parameters for simulated neutrino spectra around Super-Kamiokande detector.*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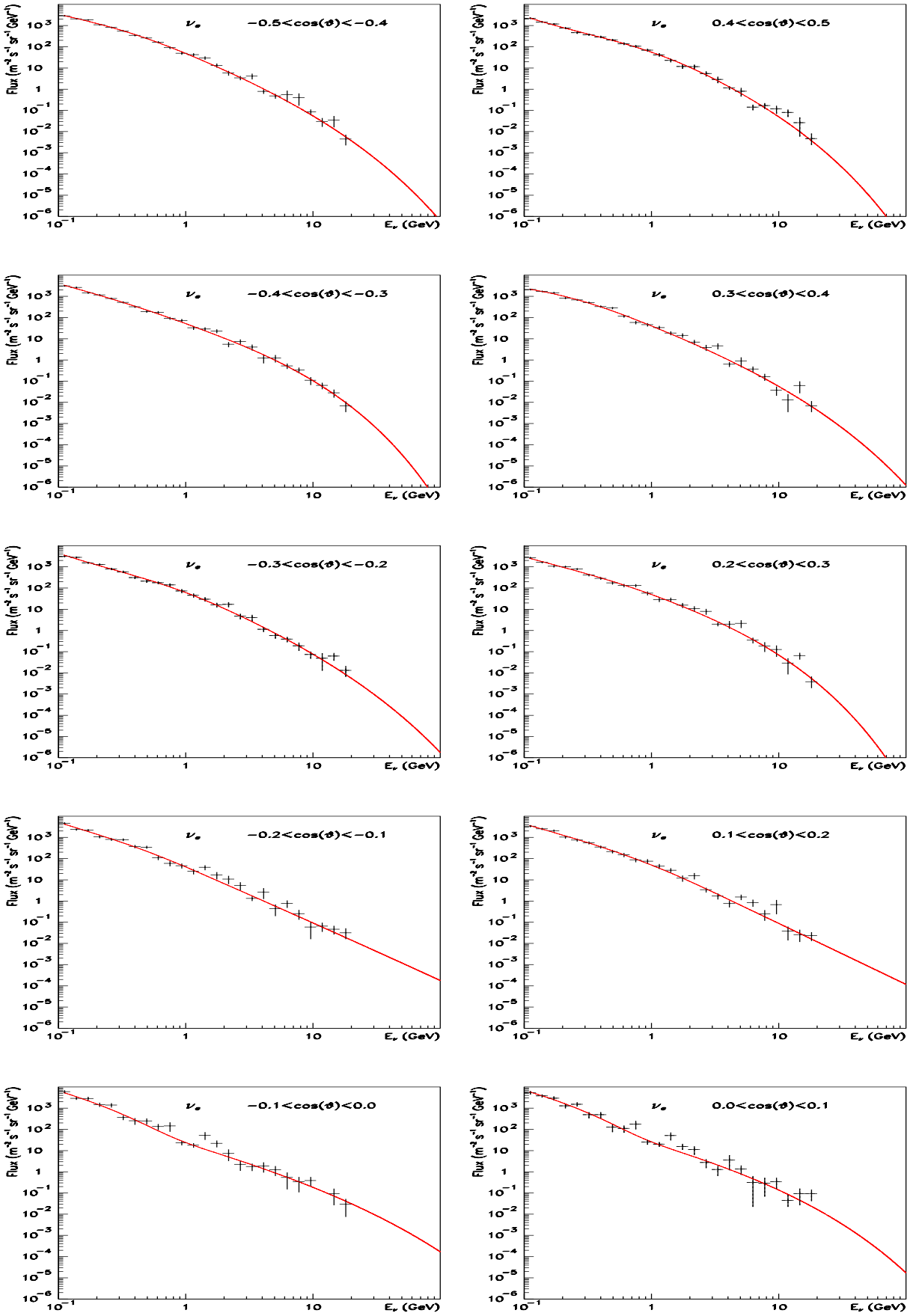
ν_e −0.9<cos(ϑ)<−0.8
ν_e 0.8<cos(ϑ)<0.9
ν_e −0.8<cos(ϑ)<−0.7
ν_e 0.7<cos(ϑ)<0.8
ν_e −0.7<cos(ϑ)<−0.6
ν_e 0.6<cos(ϑ)<0.7
ν_e −0.6<cos(ϑ)<−0.5
ν_e 0.5<cos(ϑ)<0.6
Flux (m^{-2} s^{-1} sr^{-1} GeV^{-1})
E_ν (GeV)

Figure 1: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ν_e −0.4<cos(θ)<−0.3
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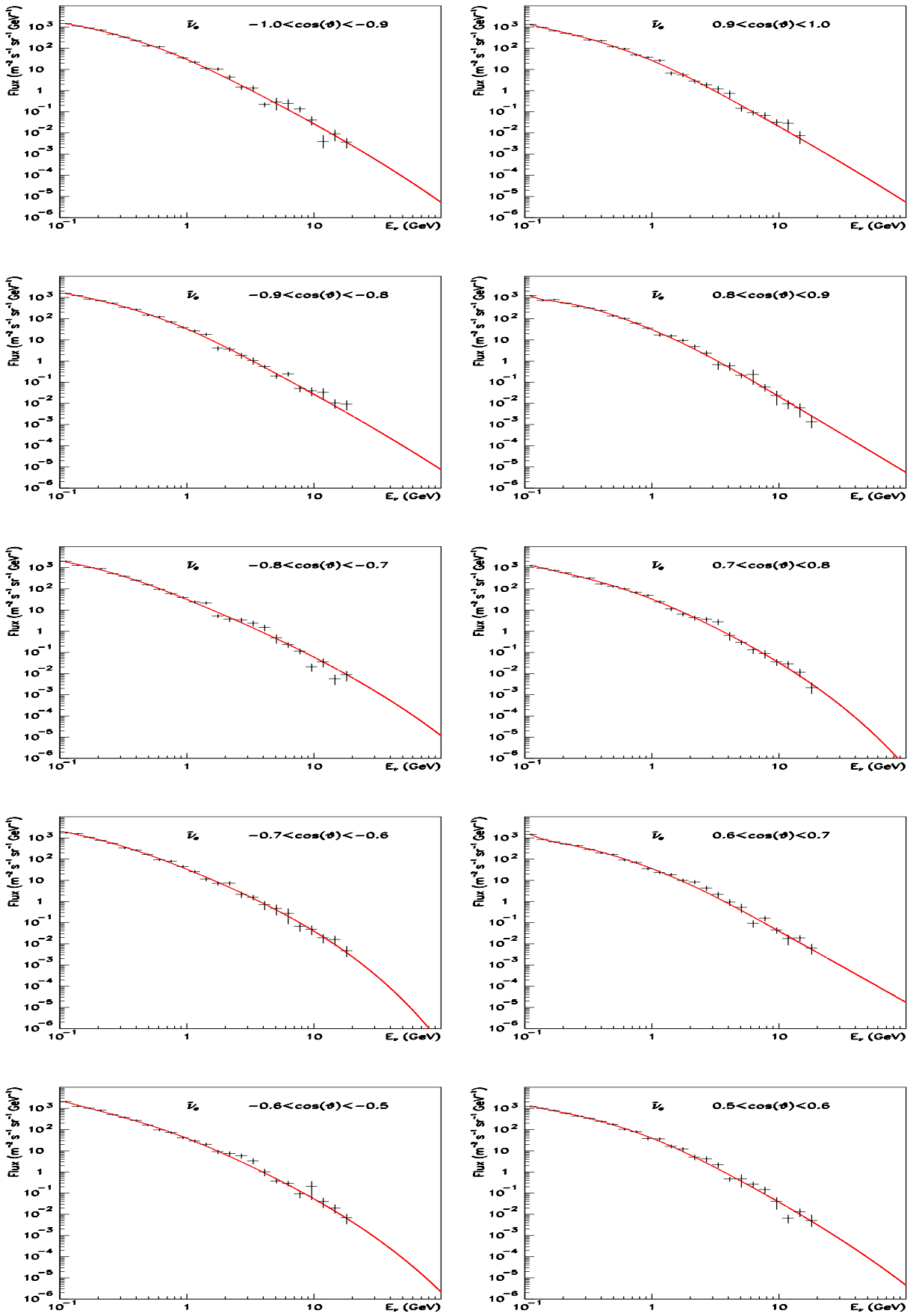
ν_e −0.3<cos(θ)<−0.2
ν_e 0.2<cos(θ)<0.3
ν_e −0.2<cos(θ)<−0.1
ν_e 0.1<cos(θ)<0.2
ν_e −0.1<cos(θ)<0.0
ν_e 0.0<cos(θ)<0.1
Flux (m⁻² s⁻¹ sr⁻¹ GeV⁻¹)
E_ν (GeV)

Figure 2: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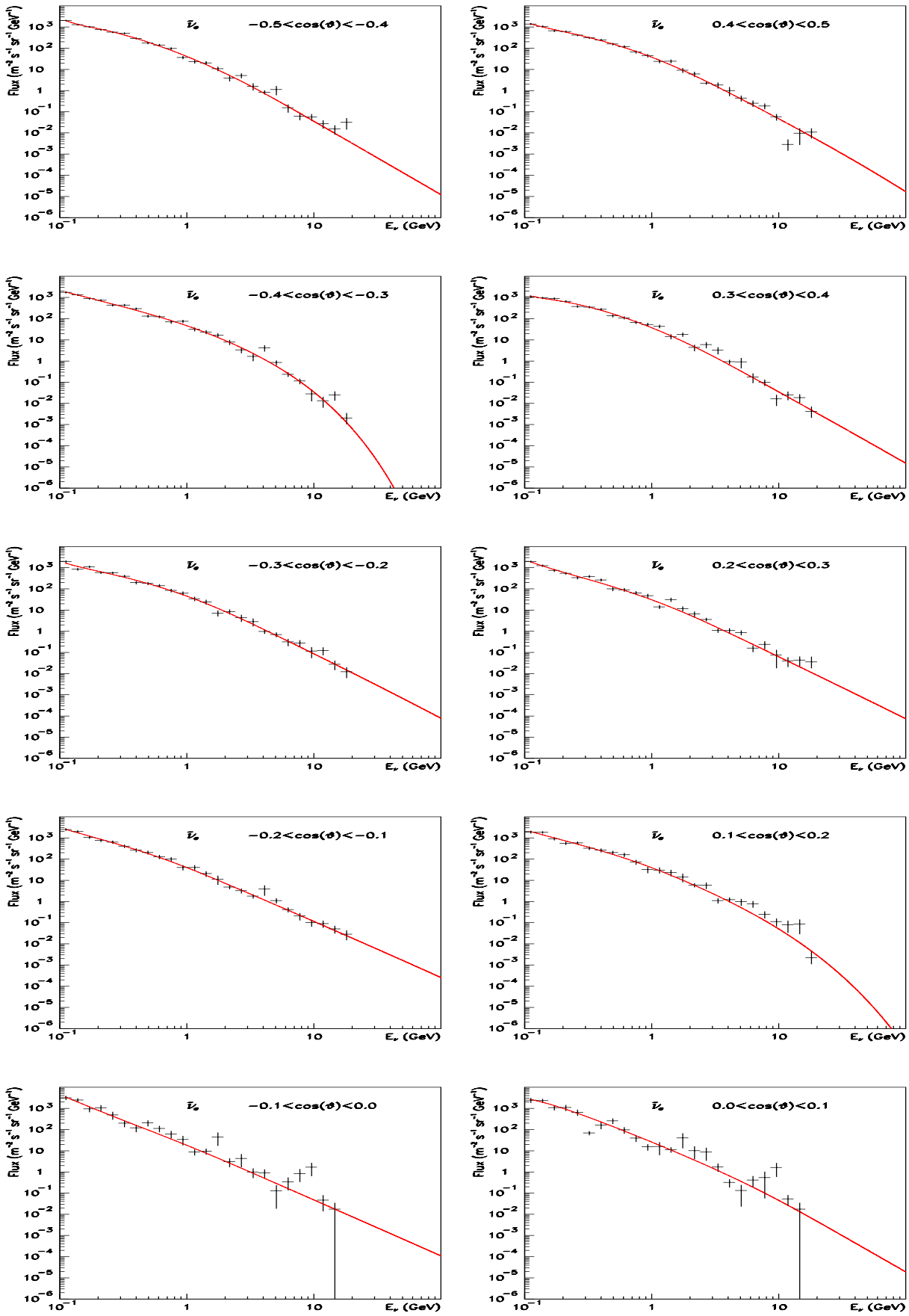
$\bar{\nu}_e$ 0.5<cos(ϑ)<0.6
Flux (m^{-2} s^{-1} sr^{-1} GeV^{-1})
$E_{\bar{\nu}_e}$ (GeV)

Figure 3: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$\bar{\nu}_e$ −0.4<cos(ϑ)<−0.3
$\bar{\nu}_e$ 0.3<cos(ϑ)<0.4
$\bar{\nu}_e$ −0.3<cos(ϑ)<−0.2
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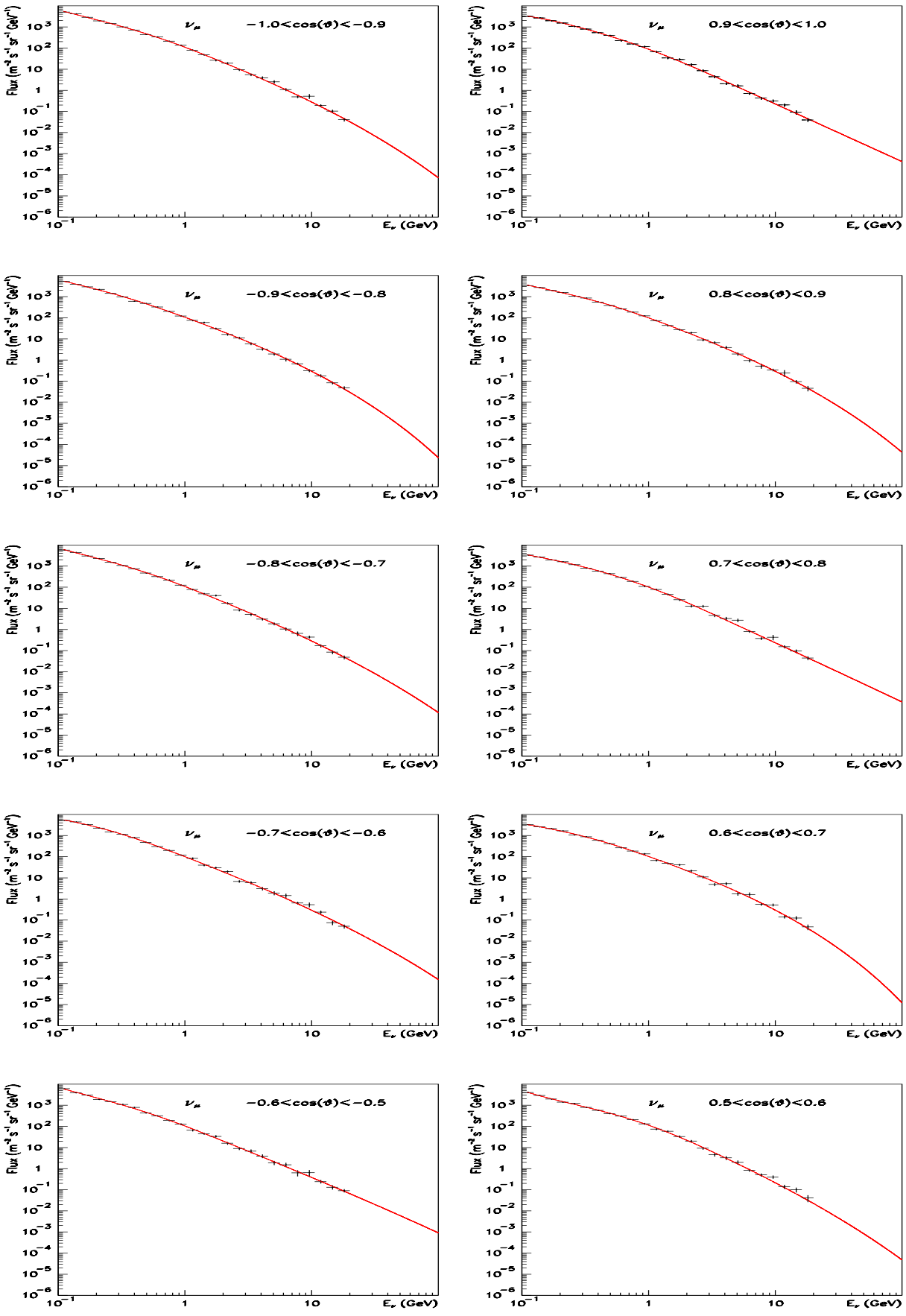
$\bar{\nu}_e$ −0.1<cos(ϑ)<0.0
$\bar{\nu}_e$ 0.0<cos(ϑ)<0.1
Flux (m^{-2} s^{-1} sr^{-1} GeV^{-1})
$E_{\bar{\nu}_e}$ (GeV)

Figure 4: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ν_μ −0.8<cos(ϑ)<−0.7
ν_μ 0.7<cos(ϑ)<0.8
ν_μ −0.7<cos(ϑ)<−0.6
ν_μ 0.6<cos(ϑ)<0.7
ν_μ −0.6<cos(ϑ)<−0.5
ν_μ 0.5<cos(ϑ)<0.6
Flux (m⁻² s⁻¹ sr⁻¹ GeV⁻¹)
E_ν (GeV)

Figure 5:

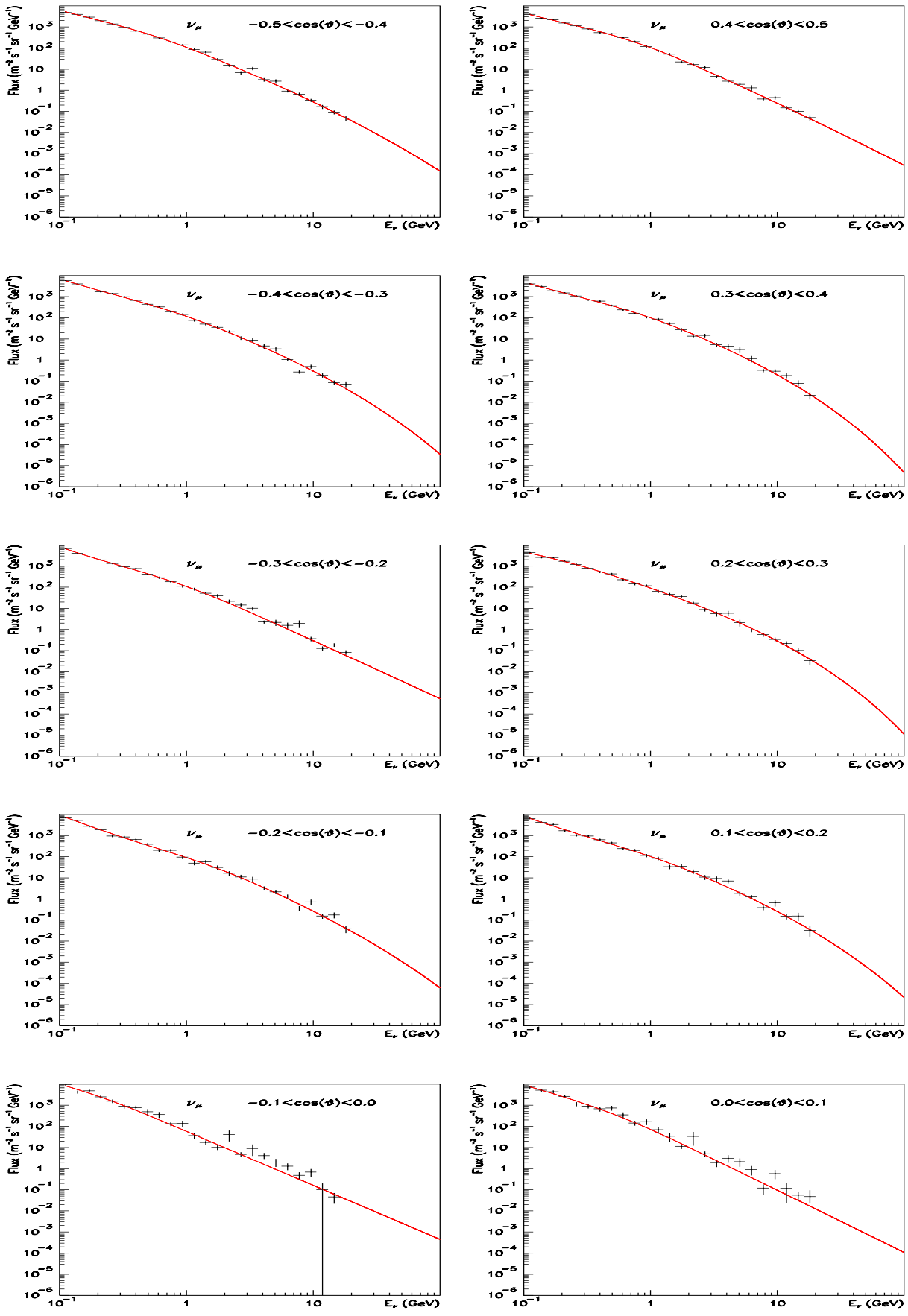
ν_μ −0.5<cos(ϑ)<−0.4
ν_μ 0.4<cos(ϑ)<0.5
ν_μ −0.4<cos(ϑ)<−0.3
ν_μ 0.3<cos(ϑ)<0.4
ν_μ −0.3<cos(ϑ)<−0.2
ν_μ 0.2<cos(ϑ)<0.3
ν_μ −0.2<cos(ϑ)<−0.1
ν_μ 0.1<cos(ϑ)<0.2
ν_μ −0.1<cos(ϑ)<0.0
ν_μ 0.0<cos(ϑ)<0.1
Flux (m⁻² s⁻¹ sr⁻¹ GeV⁻¹)
E$_\nu$ (GeV)

Figure 6:

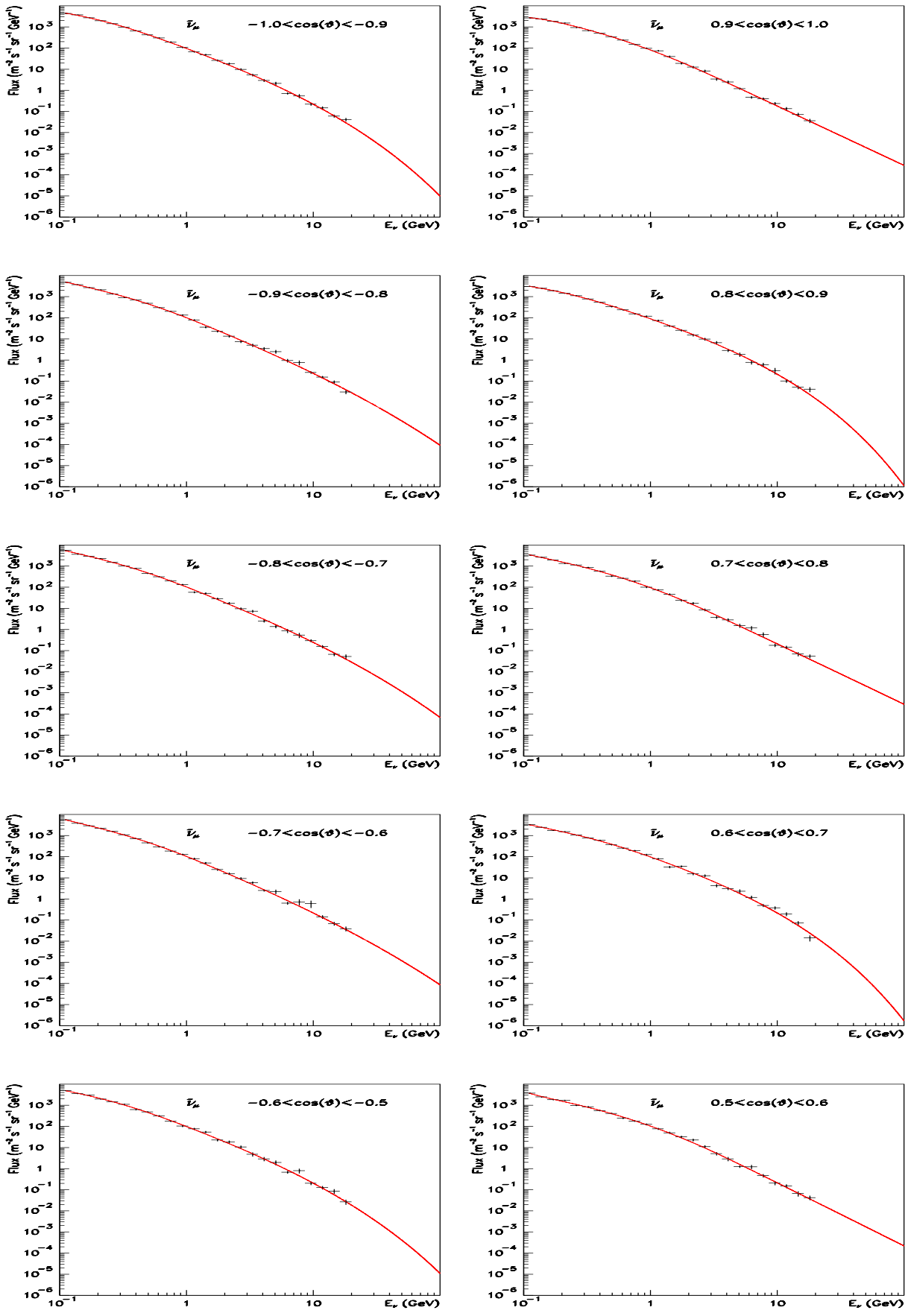
$\bar{\nu}_\mu$ −1.0<cos(ϑ)<−0.9
$\bar{\nu}_\mu$ 0.9<cos(ϑ)<1.0
$\bar{\nu}_\mu$ −0.9<cos(ϑ)<−0.8
$\bar{\nu}_\mu$ 0.8<cos(ϑ)<0.9
$\bar{\nu}_\mu$ −0.8<cos(ϑ)<−0.7
$\bar{\nu}_\mu$ 0.7<cos(ϑ)<0.8
$\bar{\nu}_\mu$ −0.7<cos(ϑ)<−0.6
$\bar{\nu}_\mu$ 0.6<cos(ϑ)<0.7
$\bar{\nu}_\mu$ −0.6<cos(ϑ)<−0.5
$\bar{\nu}_\mu$ 0.5<cos(ϑ)<0.6
Flux (m^{-2} s^{-1} sr^{-1} GeV^{-1})
E_ν (GeV)

Figure 7:

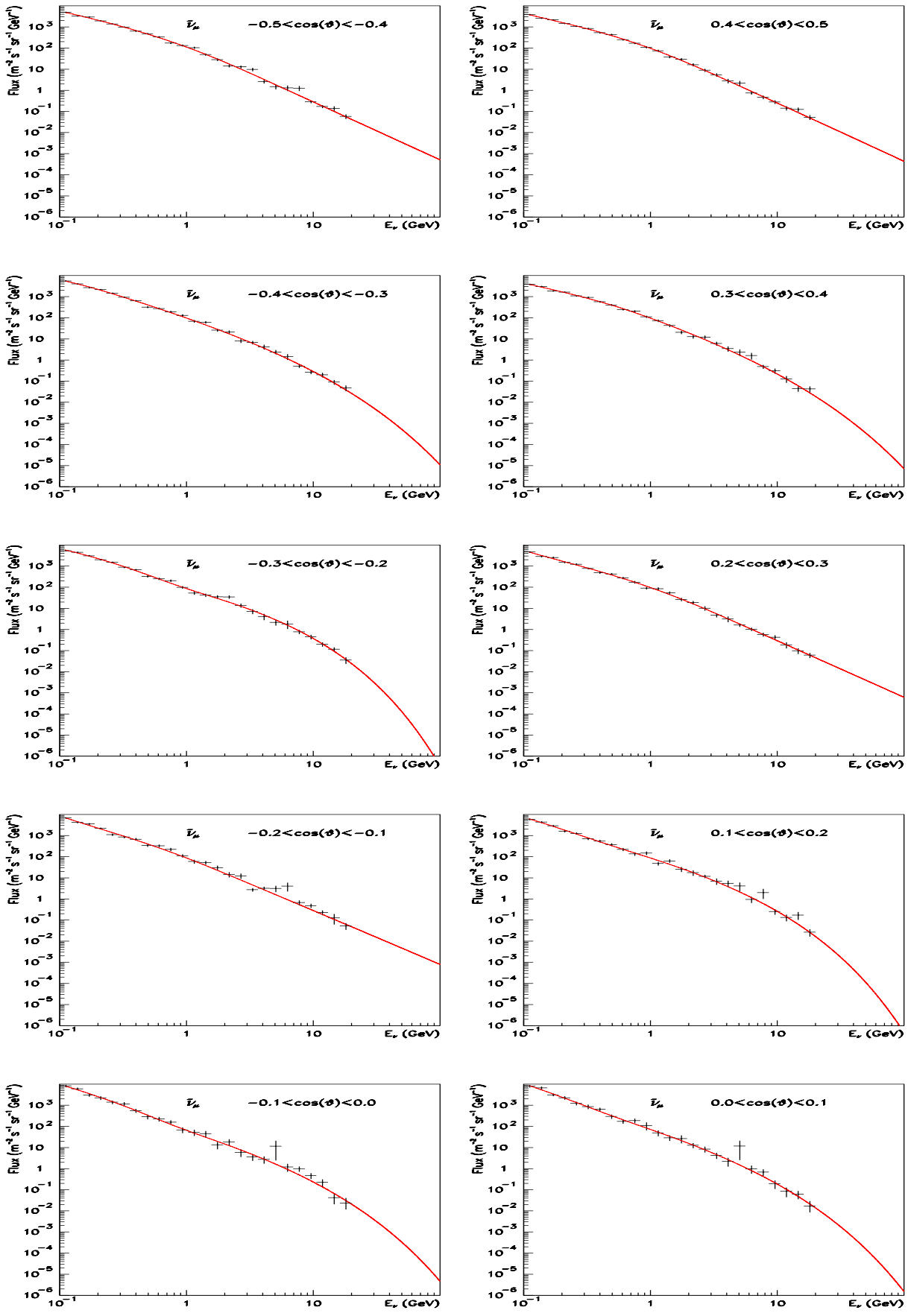
$\bar{\nu}_\mu$ −0.5<cos(ϑ)<−0.4
$\bar{\nu}_\mu$ 0.4<cos(ϑ)<0.5
$\bar{\nu}_\mu$ −0.4<cos(ϑ)<−0.3
$\bar{\nu}_\mu$ 0.3<cos(ϑ)<0.4
$\bar{\nu}_\mu$ −0.3<cos(ϑ)<−0.2
$\bar{\nu}_\mu$ 0.2<cos(ϑ)<0.3
$\bar{\nu}_\mu$ −0.2<cos(ϑ)<−0.1
$\bar{\nu}_\mu$ 0.1<cos(ϑ)<0.2
$\bar{\nu}_\mu$ −0.1<cos(ϑ)<0.0
$\bar{\nu}_\mu$ 0.0<cos(ϑ)<0.1
Flux (m^{-2} s^{-1} sr^{-1} GeV^{-1})
E_ν (GeV)

Figure 8: